DOCUMENT RESUME

ED 114 289 SE 019 857

AUTHOR Feldman, Katherine V.; And Others
TITLE Lessons Designed to Teach Fifth Grade Students the Concept Tree at the Formal Level of Attainment. Practical Paper No. 15.
INSTITUTION Wisconsin Univ., Madison. Research and Development Center for Cognitive Learning.
SPONS AGENCY National Inst. of Education (DHEW), Washington, D.C.
REPORT NO WRDCCL-PP-15
PUB DATE Jun 75
CONTRACT NE-C-00-3-0065
NOTE 73p.; Report from the Project on Conditions of School Learning and Instructional Strategies

EDRS PRICE MF-$0.76 HC-$3.32 Plus Postage
DESCRIPTORS Autoinstructional Aids; *Cognitive Development; *Concept Teaching; Earth Science; Elementary Education; *Elementary School Science; *Instructional Materials; Science Education; *Trees
IDENTIFIERS Piaget (Jean)

ABSTRACT

The autoinstructional activities included in this booklet were designed to be used to teach fifth-grade students the science concept "tree" at the formal level of attainment. The instructional strategies used in the lessons had been shown in previous studies to facilitate concept learning when used singly or in combination with one another. The strategies used are: (1) use of a definition, (2) empirical selection of concept examples through an instance probability analysis, (3) use of rational sets of examples and nonexamples, (4) pairing of examples with nonexamples, (5) emphasis of relevant attributes, (6) teaching of strategy, (7) immediate feedback, and (8) active involvement by the student. Instruction was divided into two parts, each part being a lesson. The first lesson presents the defining attributes and teaches children labels for defining attributes. The second lesson presents the definition of "trees," presents a rational set of examples and nonexamples, and teaches a strategy for evaluating whether or not an instance is an example of the concept. Active involvement and immediate feedback are provided for the student in both lessons. (Author/CP)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

ED114289

Practical Paper No. 15

LESSONS DESIGNED TO TEACH FIFTH GRADE STUDENTS THE CONCEPT TREE AT THE FORMAL LEVEL OF ATTAINMENT

by

Katherine V. Feldman, Joan M. Schilling, & Herbert J. Klausmeier

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

PERMISSION TO REPRODUCE THIS COPYRIGHTED MATERIAL HAS BEEN GRANTED BY
Wm. R. Bush
UW Regents
TO ERIC AND ORGANIZATIONS OPERATING UNDER AGREEMENTS WITH THE NATIONAL INSTITUTE OF EDUCATION FURTHER REPRODUCTION OUTSIDE THE ERIC SYSTEM REQUIRES PERMISSION OF THE COPYRIGHT OWNER

Report from the Project on
Conditions of School Learning and
Instructional Strategies

Herbert J. Klausmeier
Principal Investigator

SE 019 857

Wisconsin Research and Development
Center for Cognitive Learning
The University of Wisconsin
Madison, Wisconsin

June 1975

© 1975 - The Regents of the University of Wisconsin System for the Wisconsin Research and Development Center for Cognitive Learning.
Copyright is claimed only during the period of development, test, and evaluation, unless authorization is received from the National Institute of Education to claim copyright on the final materials. For the current copyright status, contact either the copyright proprietor or the National Institute of Education.

Published by the Wisconsin Research and Development Center for Cognitive Learning, supported in part as a research and development center by funds from the National Institute of Education, Department of Health, Education, and Welfare. The opinions expressed herein do not necessarily reflect the position or policy of the National Institute of Education and no official endorsement by that agency should be inferred.

Center Contract No. NE-C-00-3-0065

GPO 809-765-2

WISCONSIN RESEARCH AND DEVELOPMENT CENTER FOR COGNITIVE LEARNING

MISSION

The mission of the Wisconsin Research and Development Center for Cognitive Learning is to help learners develop as rapidly and effectively as possible their potential as human beings and as contributing members of society. The R&D Center is striving to fulfill this goal by

- conducting research to discover more about how children learn
- developing improved instructional strategies, processes and materials for school administrators, teachers, and children, and
- offering assistance to educators and citizens which will help transfer the outcomes of research and development into practice

PROGRAM

The activities of the Wisconsin R&D Center are organized around one unifying theme, Individually Guided Education.

FUNDING

The Wisconsin R&D Center is supported with funds from the National Institute of Education; the Bureau of Education for the Handicapped, U.S. Office of Education; and the University of Wisconsin.

INTRODUCTION

The following lessons were developed for use in a study with fifth grade students to determine whether or not the children's concept learning could be accelerated. The science concept "tree" was selected to be taught in the study. The instructional strategies used in the lessons had been shown in previous studies to facilitate concept learning when used either singly or in combination with one another. As reported by McMurray, Bernard, and Klausmeier (1974), these instructional strategies are: a) use of a definition (Anderson & Kulhavy, 1972; Feldman & Klausmeier, 1974) b) empirical selection of concept examples through an instance probability analysis (Woolley & Tennyson, 1972) c) use of rational sets of examples and nonexamples (Markle & Tiemann, 1969; Feldman, 1972; Swanson, 1972) d) pairing of examples with nonexamples (Tennyson, Woolley, & Merrill, 1972; McMurray, 1974; Houtz, Moore & Davis, 1973) e) emphasis of relevant attributes (Rasmussen & Archer, 1961), f) teaching of a strategy (Bourne, 1966), g) immediate feedback (Clark, 1971), and h) active involvement by the student (Piaget, 1964).

The lessons were designed to teach the concept "tree" to the formal level of concept attainment as specified in the Model of Conceptual Learning and Development (Klausmeier, Ghatala, & Frayer, 1974). Instruction was divided into two parts, each part constituting one lesson. The first lesson (TR I) presents the defining attributes of the concept "tree" and teaches the children labels for these

defining attributes. The second lesson (TR II) presents the definition of "tree", presents a rational set of examples and nonexamples of the concept, and teaches a strategy for evaluating whether or not an instance is an example or nonexample of the concept. In both lessons the children are actively involved in the learning process by responding to questions, drawing pictures showing the defining attributes, and evaluating examples and non-examples of the concept. Immediate feedback is given the children regarding the correctness of their responses.

TABLE OF CONTENTS

	Page
Introduction	v
Directions for Administering Lesson TR I	1
Lesson TR I.	3
Directions for Administering Lesson TR II.	39
Lesson TR II	41
References	65

Directions for Administering Lessons
TR I

Good Morning

When you hear your name called, please come up and get a lesson booklet. When you get your booklet, write or print your name, your teacher's name, and the name of your school on the cover. Also put your grade and today's date. Then circle whether you are a boy or a girl. I'll put the school's name and the date on the board.

I am passing out more than one kind of lesson. It may be that you are reading a different kind of lesson from everyone else. But don't worry about it because this is the way it's supposed to be. Please do not open your booklet until I tell you to.

(Pass out booklets. Wait until everyone has filled in cover.)

Your are going to read this lesson to yourself. While you are reading there may be some words that you cannot read. If you raise your hand,I will come by and tell you what the words are. Also, if you come to a part that you don't understand, raise your hand and I will come by.

Now turn to the first page where it says WORD LIST. These are some of the words which you may find in your lessons. Because some of them may be new to you, let's take a minute to go over them. The first word is _____. Now let's say it all together _____. The next word is _____. (Continue until all the words have been pronounced.)

perennial	bacteria
absorb	evergreens
minerals	Roman
symbol	tassels
transport	decidere
substances	autumn
develop	shrub
Mayan	bamboo
coniferous	whorled
deciduous	alternate
Hindu-Arabic	Latin
energy	

From now on there can be no talking to each other or out loud. If you want to ask a question, raise your hand. Do not disturb your classmates.

Are there any questions? No talking please. Now turn the page and begin reading.

TR I

Name _____

School _____

Grade _____

Teacher _____

Date _____

Circle one Girl Boy

WORD LIST

perennial

absorb

minerals

symbol

transport

substances

develop

Mayan

coniferous

deciduous

Hindu-Arabic

energy

bacteria

evergreens

Roman

tassels

decidere

autumn

shrub

bamboo

whorled

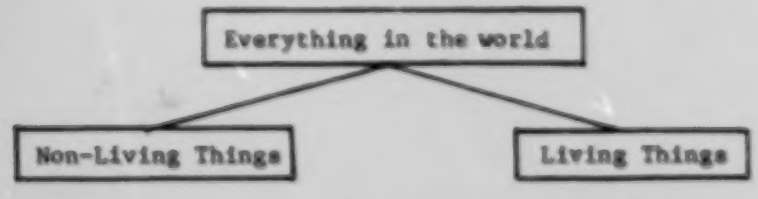
alternate

Latin

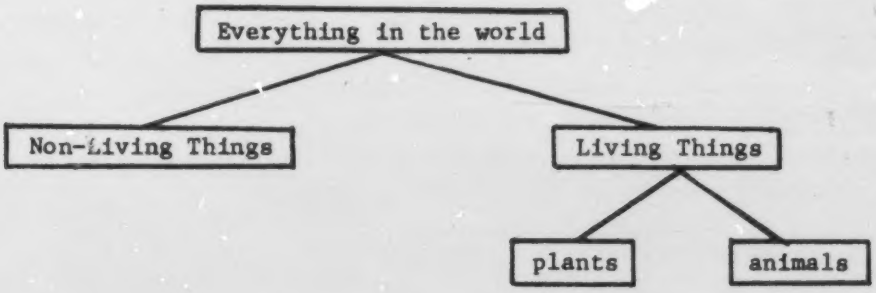
We live in the world.

But we're not alone. There are many things in the world besides us. (You've probably noticed!)

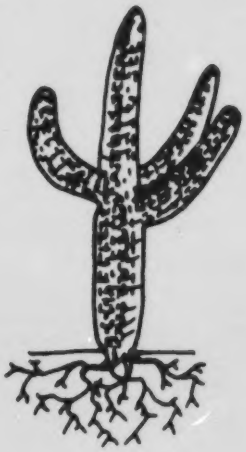
Everything in the world belongs to one of two groups:



We can also put all the living things in the world into two groups:



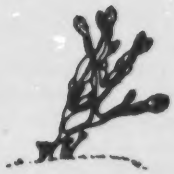
All living things are either plants or animals. This lesson is about plants. Are you ready? Here are some pictures of different plants.



Plants differ from each other in many ways.

Some plants have roots and some plants haven't.

roots



no roots

Some plants have seeds and some plants haven't.

seeds

no seeds

Some plants have leaves and some plants haven't.

leaves

no leaves

Some plants have **one main stem** and some plants have more than one main stem.

one main stem

many stems

Some plants have **woody stems** and some plants haven't.

woody stem

non-woody ste

Some plants live for many years and some plants live for only a short time. Plants that live for many years are called **perennial.**

perennial

non-perennial

Just now we said some things about plants and we used these words:

roots

seeds

leaves

one main stem

woody stem

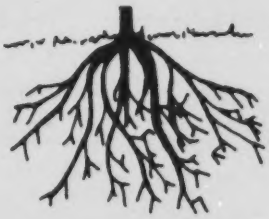
perennial

In this lesson you will learn what these words mean. Try to REMEMBER the words as you learn about them. You'll need to know them later on.

ROOTS

Let's begin with roots. Most of the time we can't see the roots of plants. They're underground. But they do several things for the plant. They hold the plant in the soil so it won't fall over. They absorb minerals and water from the soil and transport them to other parts of the plant. Plants need minerals and water to stay alive. And roots also store food and other substances.

roots →



Many plants have roots. But very simple plants, like seaweeds and mosses, have no real roots at all. They don't need roots. Other parts of the simple plants do the jobs of roots.

no roots →

Draw a picture here of a plant with roots. (Clue: a plant with a flower)

Draw a picture here of a plant without roots. (Clue: a seaweed)

Questions

Read these sentences. Circle the word TRUE if the sentence is correct. Circle the word FALSE is the sentence is not correct.

IF YOU'RE NOT SURE OF AN ANSWER, LOOK BACK AND FIND IT.

1. Plants need minerals and water to live. TRUE FALSE
2. Roots absorb water and minerals from the soil. TRUE FALSE
3. All plants have roots. TRUE FALSE

Here are the answers.

1. Plants need minerals and water to live. (TRUE) FALSE

2. Roots absorb water and minerals from the soil. (TRUE) FALSE

3. All plants have roots. TRUE (FALSE)

   [Very simple plants don't have real roots.]

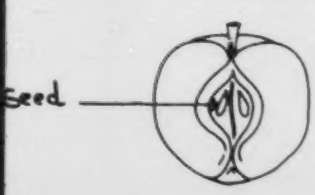
SEEDS

Now let's take a look at seeds.

Some plants have seeds and others don't. For example, a dandelion has seeds, but a mushroom doesn't. Plants that have seeds are called seed plants.

New plants grow from seeds. Under the right conditions, a seed will develop into a new plant. For example, under the right conditions, an apple seed will grow into an apple tree.

Here are some different kinds of seeds.



apple seeds

coconut

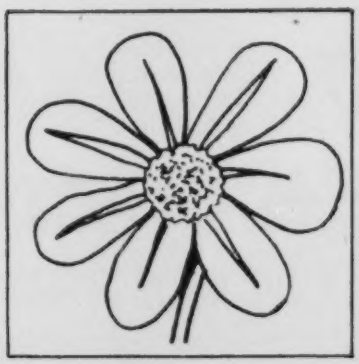
corn kernel

Draw an apple seed in this box.

This is an _____ seed.

This seed will grow into an _____ tree.

There are two kinds of seed plants. Seed plants that have flowers and seed plants that have cones. The seeds of plants that have flowers grow and develop inside the flowers. The seeds of plants that have cones grow and develop inside the cones. You can probably think of many plants that have flowers--rose bushes, apple trees, and dandelions. You can probably think of plants that have cones too--like pine trees.



Seeds grow inside of flowers and cones

Flower

Cone

Plants that have cones are called coniferous. Can you see the word cone in the word coniferous? Draw a circle around the letters in coniferous that mean cone:

CONIFEROUS

Here is the answer: CONIFEROUS

The first three letters are the part that means cone.

Try to remember:

The seeds of coniferous plants grow inside the cones.

The seeds of plants that have flowers grow inside the flowers.

Questions

Read these sentences. Circle the word TRUE if the sentence is correct. Circle the word FALSE if the sentence is not correct.

IF YOU'RE NOT SURE OF AN ANSWER, LOOK BACK AND FIND IT.

1. New seed plants grow from seeds. TRUE FALSE
2. All plants have seeds. TRUE FALSE
3. All seed plants have flowers. TRUE FALSE

Draw a circle around the correct answer for question #4.

4. Seed plants that have cones are called:

deciduous enclosed coniferous

Here are the answers.

1. New seed plants grow from seeds. (TRUE) FALSE

2. All plants have seeds. TRUE (FALSE)

   [Not all plants have seeds. Remember, simple plants like mushrooms, have no seeds.]

3. All seed plants have flowers. TRUE (FALSE)

   [Some seed plants have flowers and some have cones.2

4. Seed plants that have cones are called:

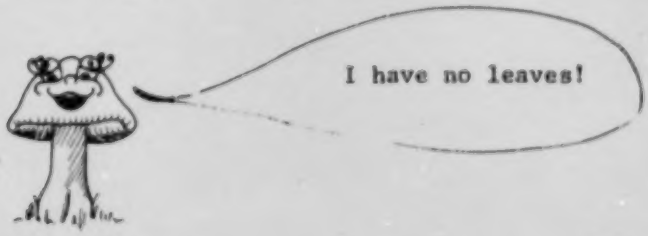
   deciduous enclosed (coniferous)

LEAVES

What do leaves do for a plant? The main thing that leaves do is make food. They make food using the energy from the sun.

Another important thing that leaves do is store food and water.

Some simple plants, like bacteria and mushrooms, have no real leaves at all.

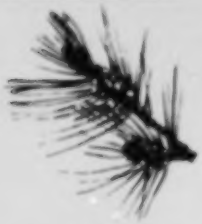


mushroom

A simple plant

There are two main kinds of leaves.

Needle Leaves and Broad Leaves



Here is a sewing needle.

And here is a leaf from a needle leaf plant.

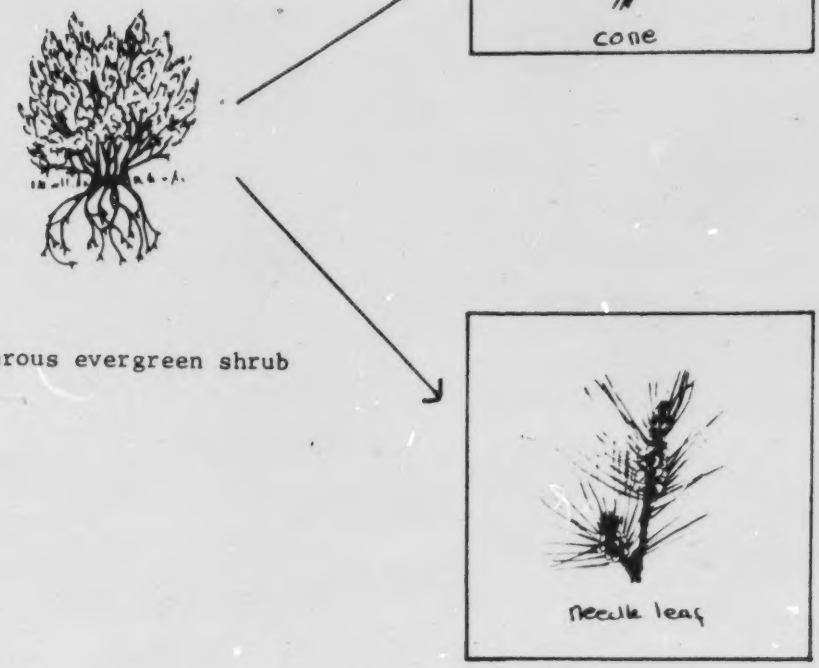
Can you see why needle leaves are called needle leaves? Good!

Broad means wide. Broad leaves are wider than needle leaves. Here are some broad leaves.

Draw a picture here of a plant with needle leaves. (Clue: a pine tree)

Draw a picture here of a plant with broad leaves. (Clue: a maple tree)

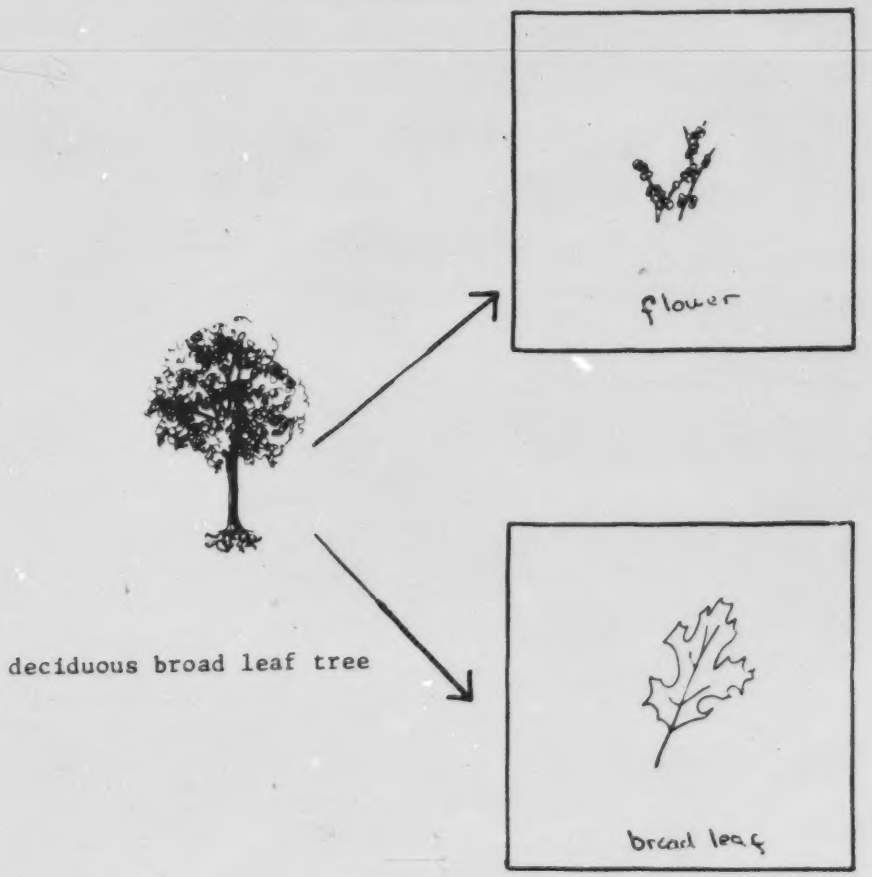
All plants with <u>needle leaves</u> are <u>coniferous</u>. Do you remember the word <u>coniferous</u>? It means that the plant has cones. Plants with needle leaves are also green all year round. So they are called <u>evergreens</u>. They don't lose all their leaves in the fall when it grows cold. Their needles fall and are replaced as they lose them a few at a time all year long. Because plants with needle leaves are coniferous and are green all year round, they are called <u>coniferous evergreens</u>.



coniferous evergreen shrub

Most plants with broad leaves have flowers. Think about a rose bush or a water lily. They have broad leaves and flowers. Other plants have flowers that don't really look like flowers. For example, the flowers of the oak tree are long green tassels that bloom in the spring.

There is also something else that is important about plants with broad leaves. Most plants with broad leaves are deciduous. The word deciduous comes from an old Latin word, "decidere," that means "to fall." You see, deciduous plants lose all of their leaves in the autumn at the end of the growing season. That's why we call autumn the Fall of the year.



Try to remember:

Plants with needle leaves are coniferous and are green all year round. They are called coniferous evergreens.

Most plants with broad leaves have flowers and are deciduous.

Deciduous plants lose their leaves in the fall.

Questions

IF YOU'RE NOT SURE OF AN ANSWER, LOOK BACK AND FIND IT.

1. All plants have leaves.	TRUE	FALSE
2. Leaves make food.	TRUE	FALSE
3. There are two kinds of leaves: needle leaves and broad leaves.	TRUE	FALSE
4. All plants with needle leaves are coniferous.	TRUE	FALSE
5. Plants with needle leaves lose their leaves in the fall.	TRUE	FALSE
6. Most broad leaf plants are deciduous and have flowers.	TRUE	FALSE
7. Deciduous trees lose their leaves in the Spring.	TRUE	FALSE

Here are the answers.

1. All plants have leaves. TRUE (FALSE)

   [Some simple plants do not have leaves.]

2. Leaves make food. (TRUE) FALSE

3. There are two kinds of leaves: needle leaves and broad leaves. (TRUE) FALSE

4. All plants with needle leaves are coniferous. (TRUE) FALSE

5. Plants with needle leaves lose their leaves in the fall. TRUE (FALSE)

   [Most coniferous trees are green all year long.]

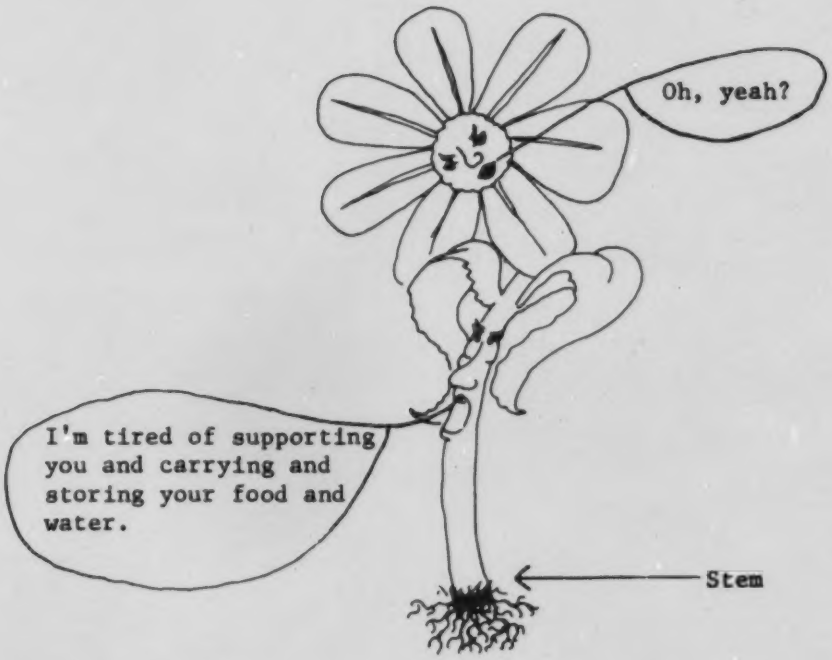
6. Most plants with broad leaves are deciduous and have flowers. (TRUE) FALSE

7. Deciduous trees lose their leaves in the Spring. TRUE (FALSE)

   [Deciduous trees lose their leaves in the Fall.]

STEMS

The stem carries water and minerals from the roots to the leaves and from the leaves to the roots. It also supports the plant and stores food and water.



Some very simple plants, like mosses, have no real stems at all.

Some plants have many main stems, like rose bushes and shrubs.

This plant has four main stems.

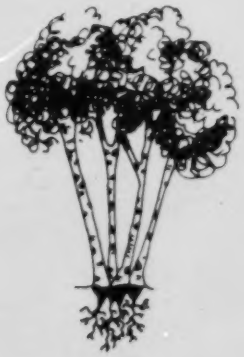
Other plants, like trees and sunflowers, have only one main stem.

This sunflower has one main stem.

The roots of each plant grow from one central place.

Even the roots of a plant with many main stems grow from one central place.

Sometimes many plants of the same kind grow together in a clump. Birch trees usually grow together in a clump. But each birch tree has its own roots.

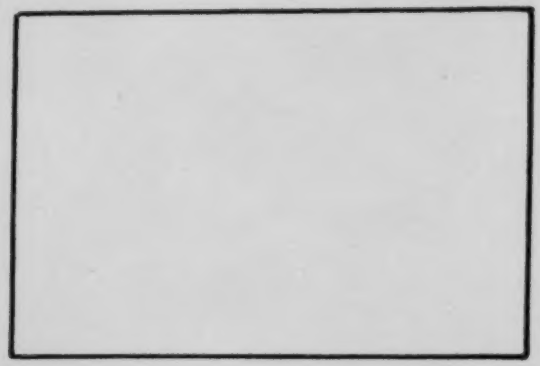


Plants that grow together, like the birch trees and like bamboo, sometimes look like one plant with many main stems. But if we could see underneath the ground, we'd notice that each of the plants has its own roots growing from one central place.

<u>one</u> plant
with many
main stems

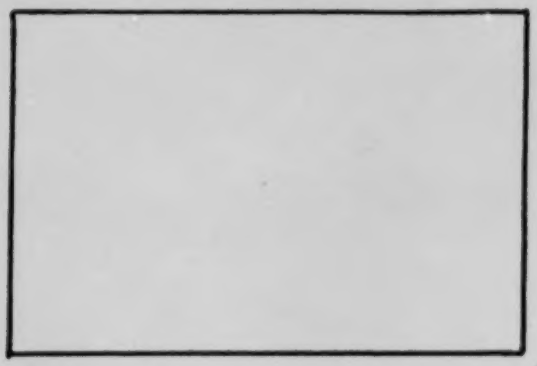
<u>three</u> plants,
each with its
own roots

Now you draw a picture of one plant with many main stems. Be sure it has roots growing from one central place. (Clue: a rose bush)



Draw a picture of one plant with one main stem. (Clue: a tree)

And now draw a picture of more than one plant growing together in a clump. Be sure each plant has its own roots. (Clue: birch trees)



Not all stems are alike. Some stems are hard and solid all the way through. Stems like this are called <u>woody stems</u>. Think of a tree trunk. It's a woody stem.

woody stem

Plants with woody stems can live for many years. The stem gets thicker every year and forms rings. If you chop down a tree and look at a slice of the trunk, you'll see how old it is by counting the rings. It adds one ring for every year.

Other stems are soft or hollow. Think about the stem of a flower or a piece of grass. They're soft. Now think about a piece of bamboo. It's hard on the outside but hollow on the inside. Look carefully at these stems. They're all soft or hollow.

Questions

IF YOU'RE NOT SURE OF AN ANSWER, LOOK BACK AND FIND IT.

1. Stems carry water and minerals. TRUE FALSE

2. Very simple plants do not have real stems. TRUE FALSE

3. All plants have only one main stem. TRUE FALSE

4. Some plants have hard, woody stems.
   Other plants have soft or hollow stems. TRUE FALSE

5. Plants that have many main stems
   have only one root system. TRUE FALSE

Here are the answers.

1. Stems carry water and minerals. (TRUE) FALSE

2. Very simple plants don't have real stems. (TRUE) FALSE

3. All plants have only one main stem. TRUE (FALSE)

   [Some plants have more than one main stem.]

4. Some plants have hard, woody stems. Other plants have soft or hollow stems. (TRUE) FALSE

5. Plants that have many main stems have only one root system. (TRUE) FALSE

PERENNIAL

Perennial plants are plants that live for more than two years. Oak trees, tulips, and rose bushes are all examples of perennial plants. Some plants grow to be very, very old. In fact, we think the oldest plant in the world is 6,000 years old! It is a Cyprus tree in China.

Cyprus tree

Another old, old tree is the "General Sherman," a redwood tree in California. It's ,500 years old.

The General Sherman

You can see how thick the trunk of the tree is by looking at the people standing next to it.

Plants that are not perennial die in one or two years. Many flowering plants (like pansies) and vegetables (like corn and carrot) are not perennial.

This is the inside of a tree that's lived for many years. It's added a ring for every year it's lived.

How old is this tree? Count the rings.

This tree is _____ years old.

Here is the answer.

The tree is 5 years old!

Now answer these questions.

IF YOU'RE NOT SURE OF AN ANSWER, LOOK BACK AND FIND IT.

1. Perennial plants live for many years. TRUE FALSE

2. The oldest plant is 100 years old. TRUE FALSE

Here are the answers.

1. Perennial plants live for many years. (TRUE) FALSE

2. The oldest plant is 100 years old. TRUE (FALSE)

[The oldest plant is probably 6,000 years old. It is probably the oldest living-thing in the world.]

LET'S GET IT ALL TOGETHER!

Think of the words you've been reading about.

ROOTS

SEEDS

LEAVES

ONE MAIN STEM

WOODY STEM

PERENNIAL

There is only one kind of plant in the world that has all of these things together. Do you know what it is? If you do, draw it here.

LEAVES
SEEDS
ROOTS

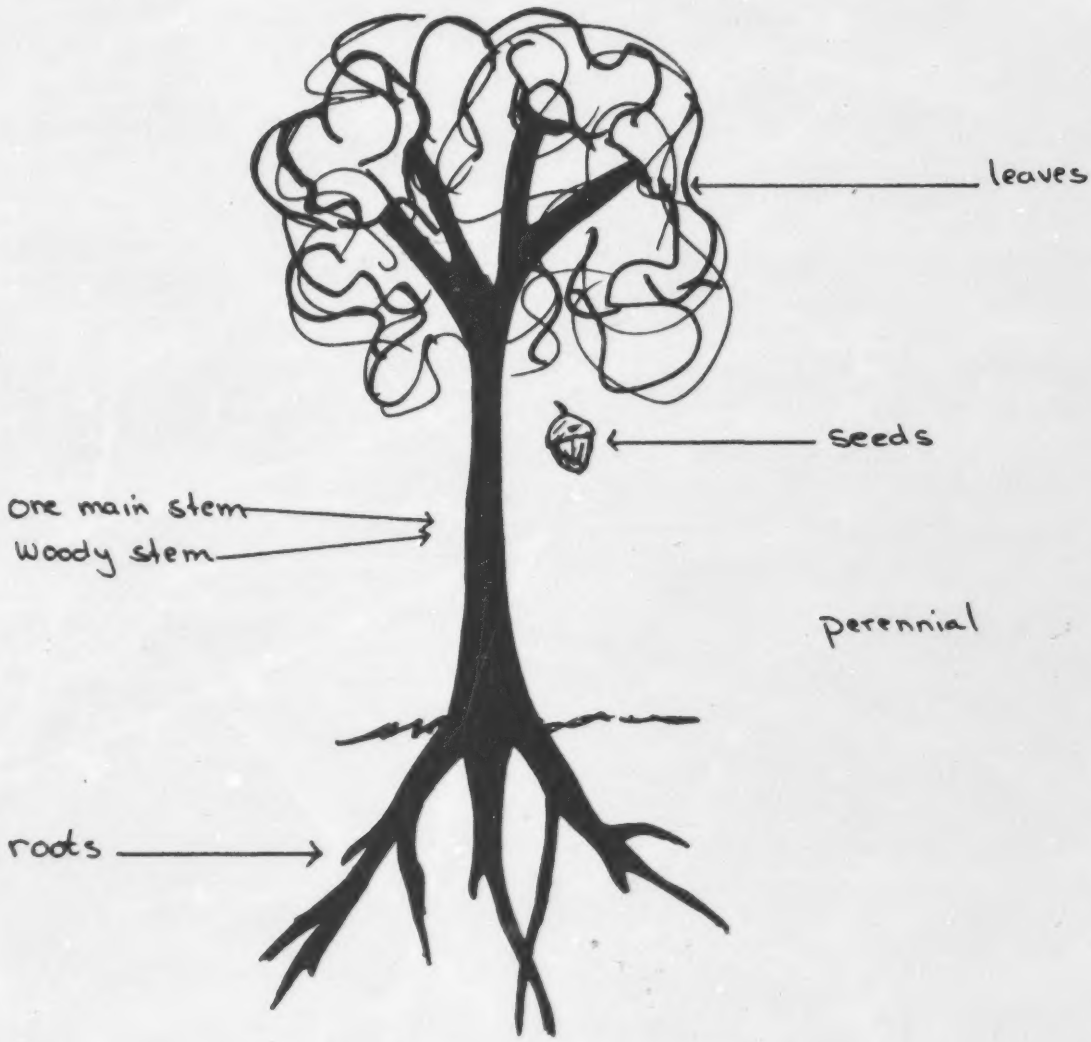
PERENNIAL
ONE MAIN STEM
WOODY STEMS

If you don't know, turn the page and find out!

It is a tree!

A tree is the only plant that has all these things put together:

ROOTS | SEEDS | LEAVES | ONE MAIN STEM | WOODY STEM | PERENNIAL



TREE

GPO 809-785-7

Directions for Administering Lessons

TR II

Good Morning

When you hear your name called, please come up and get a lesson booklet. When you get your booklet, write or print your name on the cover.

Just like yesterday, I'm passing out more than one kind of lesson. You may be reading a lesson that's different from everybody else's. That's the way it's supposed to be. Please do not open your booklet till I tell you to.

(Pass out the booklets. Wait till everyone has filled in the cover.)

Just like yesterday, you're going to read this lesson to yourselves. While you're reading there may be some words that you cannot read. Then, raise your hands and I'll come by and tell you what the words are. Also, just as yesterday, if you come to a part that you don't understand, raise your hand and I'll come by.

These lessons will be a little different from yesterday's lessons, but you'll do them in the same way. Read everything and think carefully about what you're reading. In some parts, you'll just be reading. In other parts it will tell you to do something. If it doesn't tell you to do something, just read the page carefully.

Now, turn to the first page where it says "word list". Because some of these words may be new to you, let's take a minute

to go over them. The first word is _____, etc.

From now on there can be no talking, to each other or out loud. If you want to ask a question, raise your hand. Do not disturb your classmates.

Are there any questions? No talking, please. Now turn the page and begin reading.

TR II

Name _____

48

WORD LIST

definition

curve

seaweed

mushroom

tulip

segment

dandelion

lady slipper

herb

opposite

jungle

properties

stalk

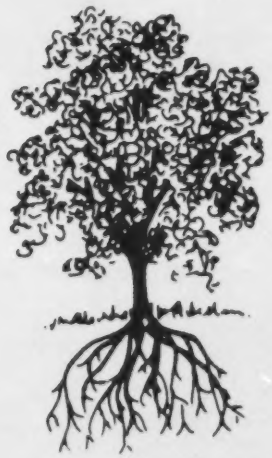
riddle

In this lesson you are going to learn about trees. First read the definition in the box below. It tells you exactly what a tree is.

> A tree is a kind of plant. It has roots, leaves, and seeds. It also has one main stem that is woody. Trees are perennial.

The first thing the definition tells you is that trees are a kind of plant. Look at the two figures below. How are they different?

1.



2.

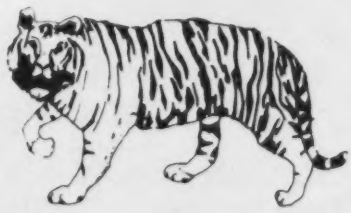


Figure 1 is a picture of a plant. But figure 2 is not a picture of a plant. Figure 2 is a picture of a kind of animal--a tiger. Remember, the first important thing to learn about trees is that ALL TREES ARE PLANTS.

Now read the definition of tree again.

> A tree is a kind of plant. It has roots, leaves, and seeds. It also has one main stem that is woody. Trees are perennial.

The next thing the definition says is that all trees have roots. Look carefully at the two figures below. Figure 3 is a picture of a tree. It is easy to see the tree's roots. Figure 4 is a picture of a very simple plant called a seaweed. Some simple plants, like the seaweed, have no roots.

3.

4.

Try to remember that ALL TREES HAVE ROOTS.

Look at the definition once more.

> A tree is a kind of plant. It has roots, leaves, and seeds. It also has one main stem that is woody. Trees are perennial.

The definition also says that trees have leaves. Look at these figures.

5.

6.

Figure 5 is a picture of a tree. You can see the leaves. Figure 6 is not a picture of a tree. Figure 6 is another picture of a very simple plant, this time a mushroom. It has no leaves. Mushrooms and all other kinds of simple plants have no real leaves.

ALL TREES HAVE LEAVES.

Next look at the definition again.

> A tree is a kind of plant. It has roots, leaves, and seeds. It also has one main stem that is woody. Trees are perennial.

The next thing the definition tells you is that trees have seeds. Look at these figures.

7.

8.

Figure 7 is a picture of a tree. It's hard to draw the seeds on the tree, so we drew a seed next to the tree. The seed is an acorn. Figure 8 is not a picture of a tree. It's a picture of a fern. Ferns and simple plants like seaweeds and mushrooms do not have seeds

Try to remember, ALL TREES HAVE SEEDS.

GPO 805-785-6

Look at the definition once more. Notice that it says that trees have one main stem. Another word for a tree's stem is its trunk.

> A tree is a kind of plant. It has roots, leaves, and seeds. It also has one main stem that is woody. Trees are perennial.

Look carefully at these figures.

9.

10.

Figure 9 is a picture of a tree. You can see that it only has one main stem or trunk. Figure 10 is a picture of a shrub. Shrubs have many stems.

Remember, ALL TREES HAVE ONE MAIN STEM.

The definition of tree also says that a tree's stem (or trunk) is woody. Look at the definition again.

> A tree is a kind of plant. It has roots, leaves, and seeds. It also has one main stem that is woody. Trees are perennial.

The definition states that trees have woody stems. You remember what a woody stem is. It is a stem that is hard and solid all the way through. Look carefully at these figures.

11.

12.

Figure 11 is a picture of a tree with a woody stem. It is hard and solid all the way through. Figure 12 is a picture of a kind of flower called a lady slipper. It has a soft stem. Think about the stems of tulips or dandelions. They are soft, too. Now think about the trunk of a tree. It is hard and woody.

Remember, ALL TREES HAVE WOODY STEMS.

Here is the definition again.

> A tree is a kind of plant. It has roots, leaves, and seeds. It also has one main stem that is woody. Trees are perennial.

The last thing the definition tells you is that trees are perennial. That means trees can live for many years. Do you remember the word perennial from yesterday?

Look at these figures now.

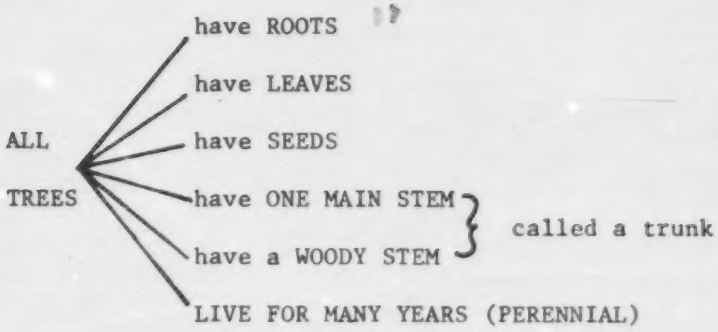
13.

14.

Figure 13 is a picture of a tree that has lived 100 years. It is perennial. Figure 14 is a picture of a corn stalk. Corn stalks and many other kinds of plants are not perennial because they die at the end of the growing season.

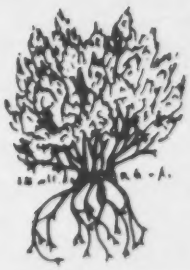
Remember, ALL TREE ARE PERENNIAL.

Now look at all of the important things to remember about trees.



A plant must have <u>all</u> of these properties to be a tree. Some plants have some of these properties, but unless they have all of them they are not trees. For example, plants called <u>herbs</u> have roots, leaves and seeds. Some of them even have one main stem and are perennial. But herbs always have soft or hollow stems. Their stems are not woody. Most flowers and vegatables are herbs. A cactus is a kind of herb, too.

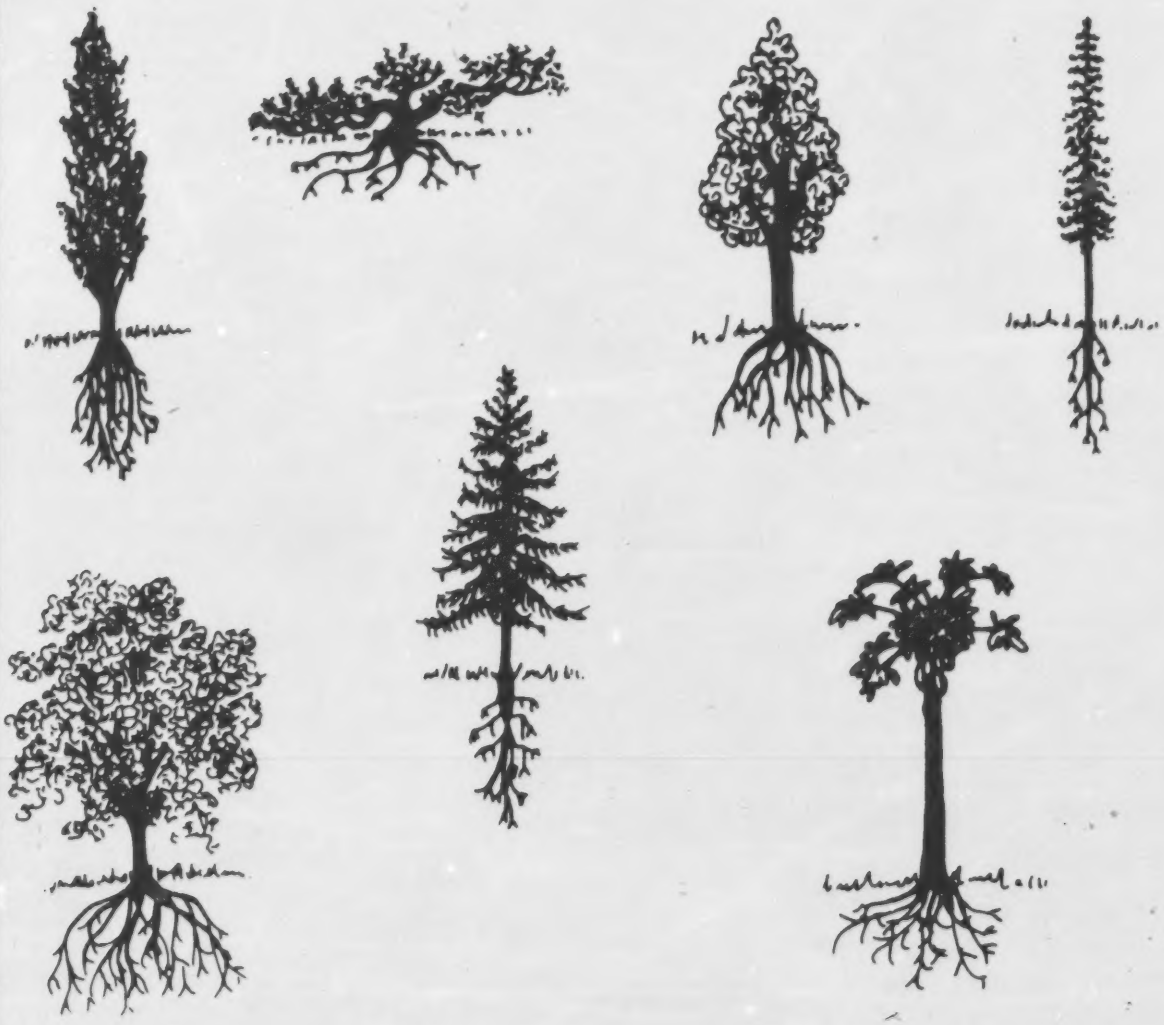
<u>Shrubs</u> are another good example of plants that have some of the properties of trees but not all of them. Shrubs have roots, leaves, and seeds. They also are perennial and are woody. But shrubs always have more than one main stem.



A shrub

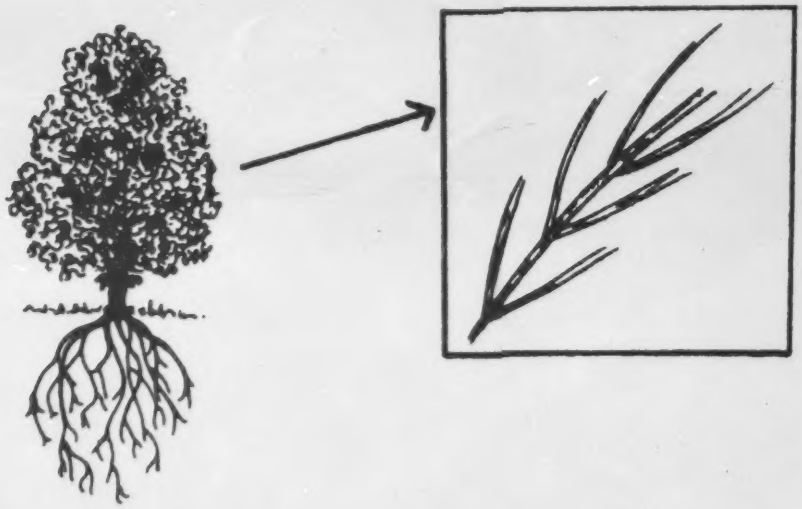
Trees are Different

Now look at all of the trees you have seen so far in this lesson. Even though they are all trees, they don't look exactly alike.

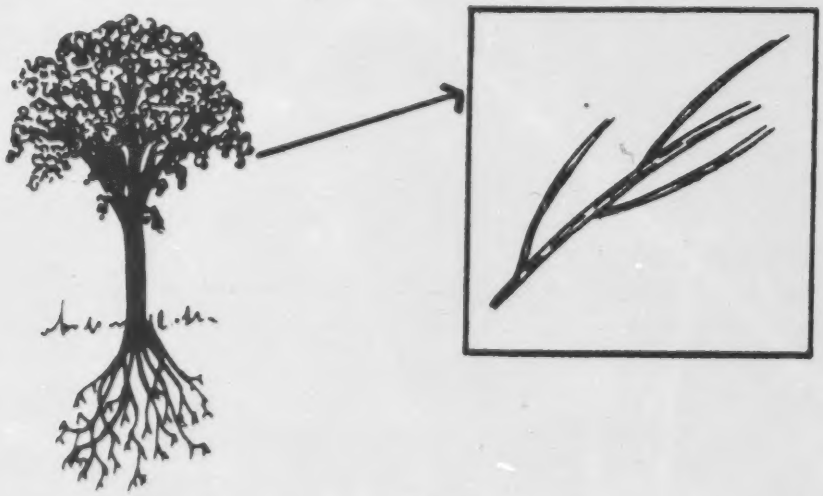


Some are short and some are tall. Some are wide and some are thin. Some are coniferous trees (you remember--that means they have cones) that have needle leaves and stay green all year. Some are deciduous trees that have broad leaves which they lose in the fall.

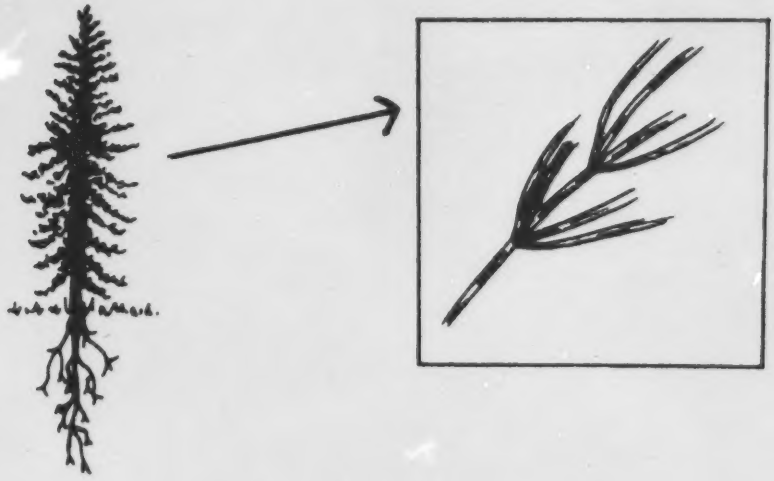
Trees also differ in the way that their branches grow. For example, look at these branches. Each branch is growing <u>opposite</u> to another branch.



Now look at these branches. They are not growing opposite to each other. They <u>alternate</u>. Only one branch grows out from any one place on the stem.



Finally look at these branches. They are growing in what is called a whorled pattern. Several branches emerge from the same spot on the stem. Only coniferous trees have branches in a whorled pattern.



Try to remember:

Only coniferous trees have branches that grow in a whorled pattern.

If all trees don't look exactly alike, how do we know if a plant is a tree? You know the answer to this question! We know a plant is a tree if we can answer YES to each of these six questions.

1.	Does it have roots?	(YES) NO
2.	Does it have leaves?	(YES) NO
3.	Does it have seeds?	(YES) NO
4.	Does it have one main stem?	(YES) NO
5.	Is the stem woody?	(YES) NO
6.	Is it perennial?	(YES) NO

?? RIDDLES ??

Now you're going to do some riddles about living things. Some will be trees. Some will not. Some may even be animals! Your job will be to decide if each living thing is a tree. Each time you read a riddle about a different living thing , ask yourself the six questions about trees. If you can answer YES to each of the six questions, you will know that the living thing is a tree. Turn the page and begin.

Read each riddle carefully. If you are not sure of an answer, read the riddle again. O.k. Turn the page and begin.

GPO 809-785-5

Remember, your job is to tell if the answer to the riddle is a tree. Read each riddle carefully. Be sure to circle YES or NO for every question. If the answer if YES to all six questions, it is a tree. If the answer is NO to any of the questions, it is not a tree. If you are not sure of an answer, read the riddle again.

Riddle 1. This living thing has long roots and many needle leaves. Its seeds grow inside cones. It has one main stem called a trunk that is very thick and woody. It has been living for 50 years.

Now answer these questions:

1.	Does it have roots?	YES NO
2.	Does it have leaves?	YES NO
3.	Does it have seeds?	YES NO
4.	Does it have one main stem?	YES NO
5.	Is the stem woody?	YES NO
6.	Is it perennial?	YES NO
7.	Is it a tree?	YES NO

Riddle 2. This living thing loves to fly. It has two big wings. It eats seeds and sometimes tiny leaves. It lives inside of an old barn. It is five years old.

1.	Does it have roots?	YES NO
2.	Does it have leaves?	YES NO
3.	Does it have seeds?	YES NO
4.	Does it have one main stem?	YES NO
5.	Is the stem woody?	YES NO
6.	Is it perennial?	YES NO
7.	Is it a tree?	YES NO

ANSWERS

Here are the answers to Riddles 1 and 2. Did you get them right? Next to the riddles are pictures of the living things the riddles are about. Read the answers and then do the riddles on the next page.

Riddle 1 This living thing has long roots and many needle leaves. Its seeds grow inside cones. It has one main stem called a trunk that is very thick and woody. It has been living for 50 years.

1. Does it have roots? (YES) NO
2. Does it have leaves? (YES) NO
3. Does it have seeds? (YES) NO
4. Does it have one main stem? (YES) NO
5. Is the stem woody? (YES) NO
6. Is it perennial? (YES) NO
7. Is it a tree? (YES) NO

Riddle 2 This living thing loves to fly. It has two big wings. It eats seeds and sometimes tiny leaves. It lives inside of an old barn. It is five years old.

1. Does it have roots? YES (NO)
2. Does it have leaves? YES (NO)
3. Does it have seeds? YES (NO)
4. Does it have one main stem? YES (NO)
5. Is the stem woody? YES (NO)
6. Is it perennial? (YES) NO
7. Is it a tree? YES (NO)

Riddle 3 This living thing has one main stem. It is four years old. It has seeds that come from flowers. Its leaves are big and broad. The roots of this living thing go down very far into the ground. Its one main stem is woody.

1. Does it have roots? YES NO
2. Does it have leaves? YES NO
3. Does it have seeds? YES NO
4. Does it have one main stem? YES NO
5. Is the stem woody? YES NO
6. Is it perennial? YES NO
7. Is it a tree? YES NO

Riddle 4 This living thing is 20 years old. Its seeds are black and very small. It has leaves and roots. Each of its six main stems is woody.

1. Does it have roots? YES NO
2. Does it have leaves? YES NO
3. Does it have seeds? YES NO
4. Does it have one main stem? YES NO
5. Is the stem woody? YES NO
6. Is it perennial? YES NO
7. Is it a tree? YES NO

ANSWERS

Here are the answers to Riddles 3 and 4. See if you were right, then turn the page and do riddles 5 and 6.

Riddle 3 This living thing has one main stem. It is four years old. It has seeds that come from flowers. Its leaves are big and broad. The roots of this living thing go down very far into the ground. Its one main stem is woody.

1. Does it have roots? (YES) NO
2. Does it have leaves? (YES) NO
3. Does it have seeds? (YES) NO
4. Does it have one main stem? (YES) NO
5. Is the stem woody? (YES) NO
6. Is it perennial? (YES) NO
7. Is it a tree? (YES) NO

Riddle 4 This living thing is 20 years old. Its seeds are black and very small. It has leaves and roots. Each of its six main stems is woody.

1. Does it have roots? (YES) NO
2. Does it have leaves? (YES) NO
3. Does it have seeds? (YES) NO
4. Does it have one main stem? YES (NO)
5. Is the stem woody? (YES) NO
6. Is it perennial? (YES) NO
7. Is it a tree? YES (NO)

Riddle 5 This living thing has four main stems that are soft. It has roots and looks like it has leaves, but has no real leaves. It has no seeds and it will live for only one year. What a strange thing!

1. Does it have roots? YES NO
2. Does it have leaves? YES NO
3. Does it have seeds? YES NO
4. Does it have one main stem? YES NO
5. Is the stem woody? YES NO
6. Is it perennial? YES NO
7. Is it a tree? YES NO

Riddle 6 This living thing has real roots and leaves. It can live in the jungle. It has seeds and two main stems that are hollow. It will live for many years.

1. Does it have roots? YES NO
2. Does it have leaves? YES NO
3. Does it have seeds? YES NO
4. Does it have one main stem? YES NO
5. Is the stem woody? YES NO
6. Is it perennial? YES NO
7. Is it a tree? YES NO

ANSWERS

Here are the answers to Riddles 5 and 6. Read them and then try Riddles 7 and 8 on the next page.

Riddle 5 This living thing has four main stems that are soft. It has roots and it looks like it has leaves, but has no real leaves. It has no seeds and it will live for only one year. What a strange thing!

1. Does it have roots? (YES) NO
2. Does it have leaves? YES (NO)
3. Does it have seeds? YES (NO)
4. Does it have one main stem? YES (NO)
5. Is the stem woody? YES (NO)
6. Is it perennial? YES (NO)
7. Is it a tree? YES (NO)

Riddle 6 This living thing has real roots and leaves. It can live in the jungle. It has seeds and two main stems that are hollow. It will live for many years.

1. Does it have roots? (YES) NO
2. Does it have leaves? (YES) NO
3. Does it have seeds? (YES) NO
4. Does it have one main stem? YES (NO)
5. Is the stem woody? YES (NO)
6. Is it perennial? (YES) NO
7. Is it a tree? YES (NO)

Riddle 7 This living thing looks sad. It has broad leaves and drooping branches. It has roots and seeds and one main stem that is hard and solid all the way through. It is 25 years old.

1. Does it have roots? YES NO
2. Does it have leaves? YES NO
3. Does it have seeds? YES NO
4. Does it have one main stem? YES NO
5. Is the stem woody? YES NO
6. Is it perennial? YES NO
7. Is it a tree? YES NO

Riddle 8 This living thing is tall and thin. It has needle leaves and its seeds are enclosed in cones. It has roots that go deep under the ground. Its one main stem is woody. The stem has 9 rings inside, showing that it is almost 10 years old.

1. Does it have roots? YES NO
2. Does it have leaves? YES NO
3. Does it have seeds? YES NO
4. Does it have one main stem? YES NO
5. Is the stem woody? YES NO
6. Is it perennial? YES NO
7. Is it a tree? YES NO

ANSWERS

And here are the answers to Riddles 7 and 8.

Riddle 7 This living thing looks sad. It has broad leaves and drooping branches. It has roots and seeds and one main stem that is hard and solid all the way through. It is 25 years old.

1. Does it have roots? (YES) NO
2. Does it have leaves? (YES) NO
3. Does it have seeds? (YES) NO
4. Does it have one main stem? (YES) NO
5. Is the stem woody? (YES) NO
6. Is it perennial? (YES) NO
7. Is it a tree? (YES) NO

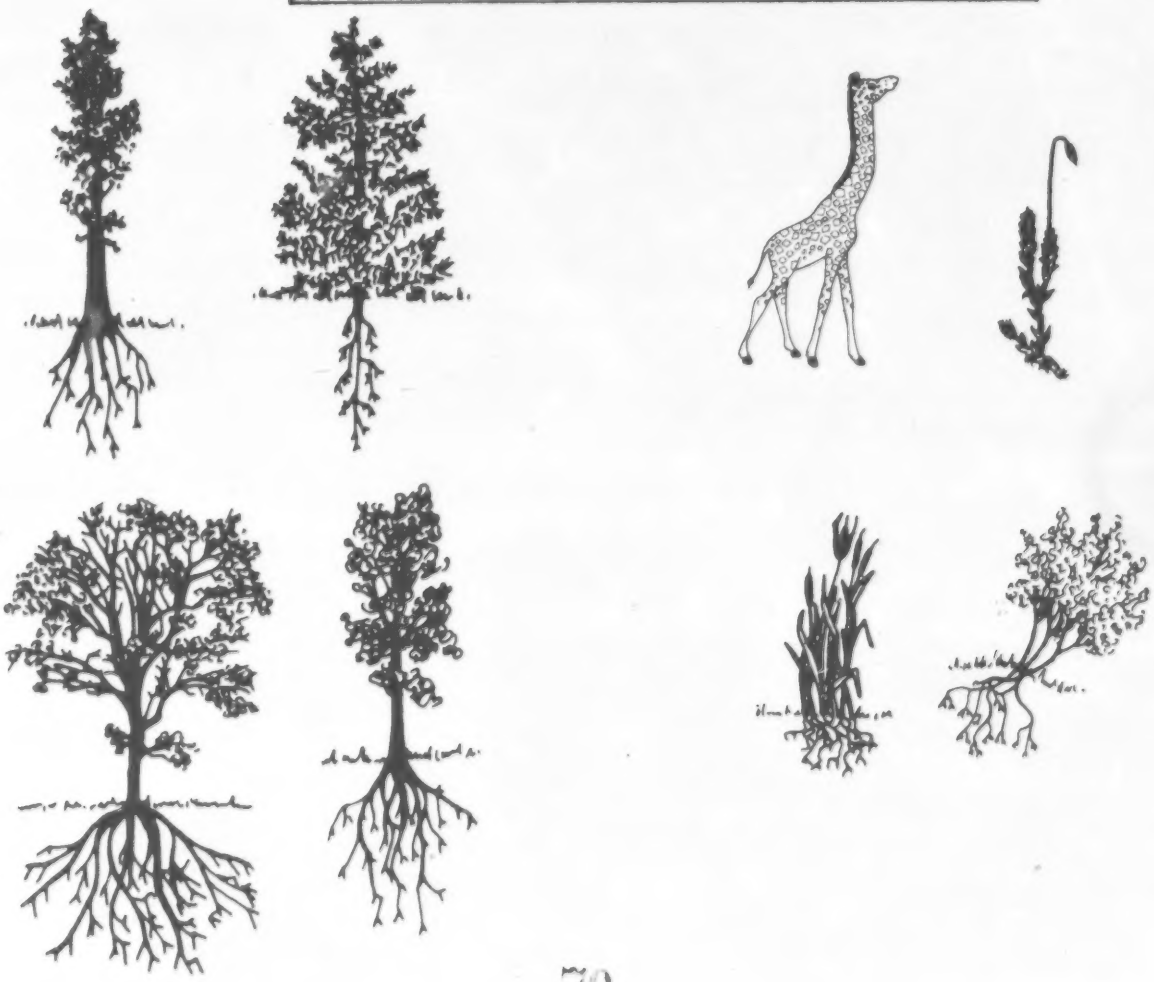
Riddle 8 This living thing is tall and thin. It has needle leaves and its seeds are enclosed in cones. It has roots that go deep under the ground. Its one main stem is woody. The stem has 9 rings inside, showing that it is almost 10 years old.

1. Does it have roots? (YES) NO
2. Does it have leaves? (YES) NO
3. Does it have seeds? (YES) NO
4. Does it have one main stem? (YES) NO
5. Is the stem woody? (YES) NO
6. Is it perennial? (YES) NO
7. Is it a tree? (YES) NO

Now you have come to the last page of this lesson. Do you know what a tree is? Do you remember that trees are a kind of plant? Do you know how trees are different from other kinds of plants? Do you know the differences among trees?

Read the definition once more. Then look at the pictures below. Think about the things you have learned.

> A tree is a kind of plant. It has roots, leaves, and seeds. It also has one main stem that is woody. Trees are perennial.



REFERENCES

Anderson, R. C., & Kulhavy, R. W. Learning concepts from definitions. American Educational Research Journal, 1972, 9, 385-390.

Bourne, L. E., Jr. Human conceptual behavior. Boston: Allyn & Bacon, 1966.

Clark, D. C. Teaching concepts in the classroom: A set of teaching prescriptions derived from experimental research. Journal of Educational Psychology, 1971, 62(3), 253-278.

Feldman, K. V. The effects of number of positive and negative instances, concept definition, and emphasis of relevant attributes on the attainment of mathematical concepts. Technical Report Number 243. Madison: Wisconsin Research and Development Center for Cognitive Learning, 1972.

Feldman, K. V., & Klausmeier, H. J. The effects of two kinds of definition on the concept attainment of fourth- and eighth-grade students. Journal of Educational Research, 1974, 67, 219-223.

Houtz, J. C., Moore, J. W., & Davis, J. K. Effects of different types of positive and negative instances on learning "nondimensional" concepts. Journal of Educational Psychology, 1973, 64, 206-211.

Klausmeier, H. J., Ghatala, E., & Frayer, D. A. Conceptual learning and development: A cognitive view. New York: Academic Press, 1974.

Markle, S. M., & Tiemann, P. W. Really understanding concepts. Champaign, Ill.: Stipes, 1969.

McMurray, N. E. The effects of four instructional strategies on the learning of a geometric concept by elementary and middle school EMR students. Unpublished doctoral dissertation, University of Wisconsin, 1974.

McMurray, N. E., Bernard, M. E., & Klausmeier, H. J. An instructional design for accelerating children's concept learning. Technical Report Number 321. Madison: Wisconsin Research and Development Center for Cognitive Learning, 1975.

Piaget, J. Three lectures. In R. E. Ripple & V. N. Rockcastle (Eds.), Piaget rediscovered. Ithaca, N. Y.: Cornell University Press, 1964.

Rasmussen, E. A., & Archer, E. J. Concept identification as a function of language pretraining and task complexity. Journal of Experimental Psychology, 1961, 61, 437-441.

Swanson, J. E. The effects of number of positive and negative instances, concept definition, and emphasis of relevant attributes on the attainment of three environmental concepts by sixth-grade children. Technical Report Number 244. Madison: Wisconsin Research and Development Center for Cognitive Learning, 1972.

Tennyson, R. D., Woolley, F. R., & Merrill, M. D. Exemplar and non-exemplar variables which produce correct concept classification behavior and specified classification errors. Journal of Educational Psychology, 1972, 63, 144-152.

Woolley, F. R., & Tennyson, R. D. Classification model of classification behavior. Educational Technology, 1972, 12, 37-39.

GPO 809-785-3

National Evaluation Committee

Francis S. Chase, Committee Chairman
Emeritus Professor, Department of Education
University of Chicago

Helen Bain
Past President
National Education Association

Lyle E. Bourne, Jr.
Institute for the Study of Intellectual Behavior
University of Colorado

Sue Buel
Dissemination and Installation Services
Northwest Regional Educational Laboratory

Roald Campbell
Emeritus Professor, Department of Educational Administration
The Ohio State University

George E. Dickson
College of Education
University of Toledo

L. R. Goulet
Departments of Educational Psychology and Psychology
University of Illinois—Champaign-Urbana

Chester W. Harris
Department of Education
University of California—Santa Barbara

W. G. Katzenmeyer
Department of Education
Duke University

Hugh J. Scott
Department of Education
Howard University

Barbara Thompson
Superintendent of Public Instruction
State of Wisconsin

Joanna Williams
Department of Psychology and Education
Teachers' College, Columbia University

Executive Committee

Richard A. Rossmiller, Committee Chairman
Director
R & D Center

William R. Bush
Deputy Director
R & D Center

M. Vere DeVault
Professor of Curriculum and Instruction
School of Education

Dale D. Johnson
Assistant Dean
School of Education

Karlyn Kamm
Developmental Specialist
R & D Center

Herbert J. Klausmeier
Principal Investigator
R & D Center

Joel R. Levin
Principal Investigator
R & D Center

James M. Moser
Senior Research Scientist
R & D Center

Len VanEss
Associate Vice Chancellor
University of Wisconsin—Madison

Faculty of Principal Investigators

Vernon L. Allen
Professor
Psychology

B. Dean Bowles
Professor
Educational Administration

Marvin J. Fruth
Professor
Educational Administration

John G. Harvey
Associate Professor
Mathematics

Frank H. Hooper
Professor
Child and Family Studies

Herbert J. Klausmeier
V. A. C. Henmon Professor
Educational Psychology

Gisela Labouvie-Vief
Assistant Professor
Educational Psychology

Joel R. Levin
Professor
Educational Psychology

L. Joseph Lins
Professor
Institutional Studies

James Lipham
Professor
Educational Administration

Wayne Otto
Professor
Curriculum and Instruction

Robert Petzold
Professor
Curriculum and Instruction

Thomas A. Romberg
Professor
Curriculum and Instruction

Richard A. Rossmiller
Professor
Educational Administration

Dennis W. Spuck
Assistant Professor
Educational Administration

Richard L. Venezky
Professor
Computer Sciences

Larry M. Wilder
Assistant Professor
Child and Family Studies